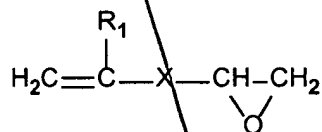


CLAIMS

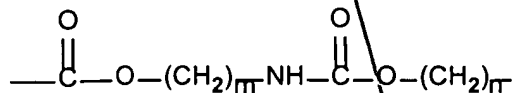
What is claimed is:

SUB-4

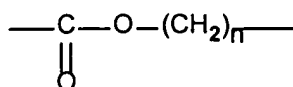
1. A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a polymeric backbone adapted to be covalently attached to the surface and comprising one or more pendent epoxide groups adapted to form covalent bonds with corresponding functional groups on the target molecule.
2. A reagent composition according to claim 1 wherein the reagent comprises a polymer formed by the polymerization of one or more monomers selected from the group glycidyl acrylate, glycidyl methacrylate, allylglycidyl ether, and glycidyl vinyl ether.
3. A reagent composition according to claim 1 wherein the reagent comprises a polymer formed by the polymerization of one or more monomers of the formula:



- where R_1 is either CH_3 or H and X is a noninterfering radical, preferably selected from the group:

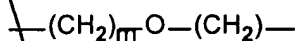


where $m = 2 - 6$ and $n = 1 - 10$;

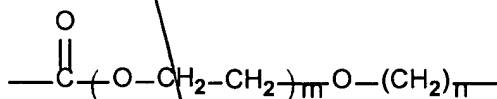


where $n = 1 - 10$;

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where $m = 0$ or 1 , and;



10 where $m = 1 - 20$ and $n = 1 - 10$.

4. A reagent composition according to claim 1 wherein the reagent comprises a polymer synthesized by reacting hydroxyl- or amine-containing polymers with diepoxides.

5. A reagent composition according to claim 1 wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

6. A reagent composition according to claim 5 wherein the nucleic acid comprises an underivatized nucleic acid.

7. A reagent composition according to claim 6 wherein the underivatized nucleic acid comprises an oligonucleotide.

8. A reagent composition according to claim 1 wherein the composition further comprises one or more latent reactive groups comprising photoreactive groups for

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covalently attaching the reagent composition to the surface upon application of energy from a suitable source.

5 9. A reagent composition according to claim 8 wherein the target molecule is a nucleic acid and the photoreactive groups are selected from the group consisting of photoreactive aryl ketones.

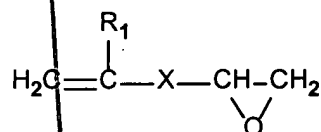
10. A reagent composition according to claim 1 wherein the polymeric backbone is selected from the group consisting of acrylics, vinyls, nylons, polyurethanes and polyethers, and the backbone further comprises one or more pendent photoreactive groups selected from the group consisting of aryl ketones.

10 11. A method of attaching a target molecule to the surface of a substrate, the method comprising:

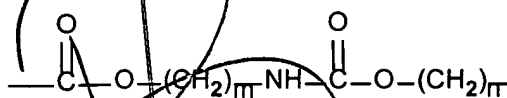
- 15 a) providing a reagent composition according to claim 1,
- b) coating and immobilizing the reagent composition on the substrate surface,
- 15 c) providing a solution comprising a target molecule having one or more functional groups thermochemically reactive with corresponding epoxide groups provided by the reagent composition,
- d) applying an amount of the solution on the substrate surface, and
- e) allowing the epoxide groups provided by the reagent composition to form
- 20 covalent bonds with corresponding functional groups provided by the target molecule in order to attach the target molecule to the surface.

12. A method according to claim 11 wherein the reagent comprises a polymer formed by the polymerization of one or more monomers selected from the group glycidyl acrylate, glycidyl methacrylate, allylglycidyl ether, and glycidyl vinyl ether.

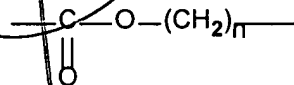
13. A method according to claim 11 wherein the reagent comprises a polymer formed by the polymerization of one or more monomers of the formula:



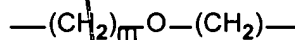
where R_1 is either CH_3 or H and X is a noninterfering radical, preferably selected from the group:



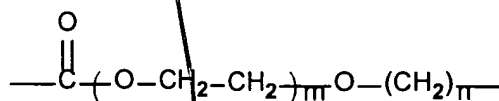
where $m = 2 - 6$ and $n = 1 - 10$;



where $n = 1 - 10$;



where $m = 0$ or 1 , and;



where $m = 1 - 20$ and $n = 1 - 10$.

14. A method according to claim 11 wherein the reagent comprises a polymer synthesized by reacting hydroxyl- or amine-containing polymers with diepoxides.

5 15. A method according to claim 11 wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

16. A method according to claim 15 wherein the nucleic acid comprises an underivatized nucleic acid.

10 17. A method according to claim 16 wherein the underivatized nucleic acid comprises an oligonucleotide.

18. A method according to claim 11 wherein the composition further comprises one or more latent reactive groups comprising photoreactive groups for attaching the reagent composition to the surface upon application of energy from a suitable source.

15 19. A method according to claim 11 wherein the method is used to prepare one or more microarrays of nucleic acids upon the surface of a slide formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic, each microarray providing at least about $10/\text{cm}^2$ distinct nucleic acids having a length of at least 10 nucleotides, the nucleic acids each being spotted in discrete regions and defined
20 amounts of between about 50 attomoles and about 10 nanomoles.

20. A method according to claim 19 wherein the regions are generally circular in shape, having a diameter of between about 75 microns and about 1000 microns and

separated from other regions in the array by center to center spacing of about 100 microns to about 1000 microns.

21. An activated slide comprising a flat support surface coated with the bound residue of a reagent composition according to claim 1.

5 22. An activated slide according to claim 21 wherein the slide is adapted for fabricating a microarray wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a slide formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

10 23. An activated slide according to claim 21 wherein the slide provides at least about $10/\text{cm}^2$ distinct nucleic acids having a length of at least 10 nucleotides, the nucleic acids each being spotted in discrete regions and defined amounts of between about 50 attomoles and about 10 nanomoles.

15 24. An activated slide according to claim 23 wherein the regions are generally circular in shape, having a diameter of between about 75 microns and about 1000 microns and separated from other regions in the array by center to center spacing of about 100 microns to about 1000 microns.

25. A microarray prepared by a method comprising:

- 20 a) providing a reagent composition according to claim 1,
b) coating and immobilizing the reagent composition on the substrate surface,
c) providing a solution comprising a target molecule comprising a nucleic acid having one or more functional groups thermochemically reactive with epoxide groups provided by the reagent composition,

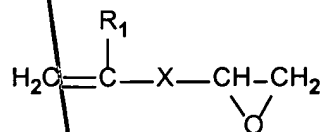
d) applying one or more discrete small sample volume spots of the solution on the surface of the substrate surface, and

e) allowing the epoxide groups provided by the reagent composition to form covalent bonds with corresponding functional groups provided by the target molecule in order to attach the target molecule to the surface.

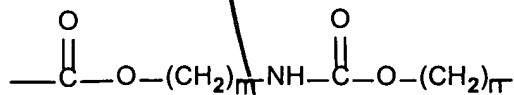
26. A microarray according to claim 25 wherein the microarray provides at least about $10/\text{cm}^2$ distinct nucleic acids having a length of at least 10 nucleotides, the nucleic acids each being spotted in discrete regions and defined amounts of between about 50 attomoles and about 10 nanomoles.

27. A microarray according to claim 26 wherein the regions are generally circular in shape, having a diameter of between about 75 microns and about 1000 microns and separated from other regions in the array by center to center spacing of about 100 microns to about 1000 microns.

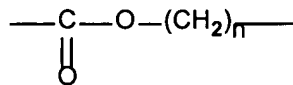
28. A microarray according to claim 25 wherein the reagent comprises a polymer formed by the polymerization of one or more monomers of the formula:



where R_1 is either CH_3 or H and X is a noninterfering radical, preferably selected from the group:

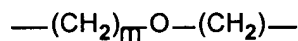


where $m = 2 - 6$ and $n = 1 - 10$;

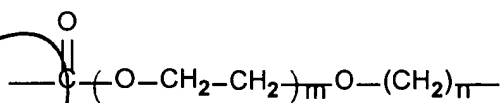


where $n = 1 - 10$;

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where $m = 0$ or 1 , and;



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where $m = 1 - 20$ and $n = 1 - 10$,

or by the reaction of hydroxyl- or amine-containing polymers with diepoxides,

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the polymeric backbone is selected from the group consisting of acrylics, vinyls, nylons, polyurethanes and polyethers,

the backbone further comprises one or more pendent photoreactive groups selected from

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the group consisting of aryl ketones,

the nucleic acid comprises an underivatized oligonucleotides,

the surface comprises the surface of a slide formed of organosilane-pretreated glass,

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organosilane-pretreated silicon, silicon hydride, or plastic,

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